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10/732,764	12/10/2003	Gisle Dankel	1801270.00135US1	6964
23483 7590 01/16/2008 WILMERHALE/BOSTON 60 STATE STREET BOSTON, MA 02109			EXAMINER WEI, ZHENG	
			ART UNIT	PAPER NUMBER
			2192	
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			01/16/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/732,764

Applicant(s)

DANKEL ET AL.

Examiner

Zheng Wei

Art Unit

2192

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 19-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 19-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Remarks

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/2007 has been entered.
2. This office action is in response to the amendment filed on 10/22/2007.
3. The objection to the specification is withdrawn in view of applicant's amendment.
4. Claims 18 and 27 have been cancelled.
5. Claims 1-17 and 19-26 remain pending and have been examined.

Response to Arguments

6. Applicant's arguments file on Oct 22, 2007, in particular on pages 8-9, has been fully considered but they are not persuasive. For example:
 - At page 8, fifth paragraph, the Applicant contends that Zheng does not teach or suggest a "simple interpreter that is capable of interpreting only a sub-set of instructions from the instruction set of a subject processor" as recited in Claim 1. However, the Examiner respectfully disagrees. It is noted that the claims have not been amended since filing response to non-final office action. The response to applicant arguments about the claims and the reason for not

allowing the amended claims (reason/prior art for rejecting the claims) had provided in the section of "response to Arguments" and body of rejection in previous office action. It also should be noted that the claim language "capable of interpreting only a subset of instruction", does not necessary exclude the situation that the simple interpreter is also capable of interpreting all instructions. Furthermore, the interpreter, as Zheng disclosed at runtime, does only interpret a sub-set of instructions that is not frequently executed by the processor(see for example, Figure 2, clearly indicates that interpreter just handles those instructions which the translation does not exist and execute count is less than translation threshold). Therefore, the examiner reasserted that Zheng, indeed, anticipated all the claimed limitation as recited in Claim 1.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 8-11, 17, 19-20 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Zheng (Zheng et al., "PA-RISC to IA-64 Transparent Execution, No Recompilation", IEEE, March 2000)

Claims 1, 10 and 19:

Zheng discloses a method, apparatus and software of selectively interpreting or translating program code in a computing environment having a target processor and a memory coupled to the target processor, the program code comprising instructions from the instruction set of a subject processor, comprising:

- Decoding said program code; (Page 48, section "HOW IT WORKS", "When the user executes an application of any kind on the IA-64 system, the HP-UX kernel starts a normal execution process. If it detects a PA-RISC executable, it maps the executable's text and data segments, loads the Aries start-up module, and transfers control to it.")
- Applying an interpreting algorithm to identify whether said program code is interpretable by a simple interpreter, said simple interpreter capable of interpreting only a subset of instructions from the instruction set of the subject processor; (see for example, figure 2, "lookup source address", "Translation exists?", "Execute count > translation threshold?" and related text. Only a subset of instruction that have not been translated and the execute count less than translation threshold is selected for interpreter; also see page 48, section "Start-up and runtime modules", "The runtime module is the hub of Aries. It is responsible for steering the control flow within a running emulation process. It tracks how many times a block has executed and decides when to invoke the dynamic translator to translate a PA-RISC block.", section "HOW IT WORKS", "The runtime module tracks how often each block executes. If a block has executed a fixed number of time (meets a translation threshold), the runtime module then invokes the dynamic translator..."). It should be noted that the claim language "capable of interpreting only a subset of instruction", does not necessary exclude the situation that the simple interpreter is also capable of interpreting all instructions. Moreover, the interpreter, as Zheng disclosed at runtime, does only interpret a sub-set of instructions that is not frequently executed by the processor(see for example, Figure 2, clearly indicates that

interpreter just handles those instructions which the translation does not exist and execute count is less than translation threshold) ;

- If said program code contains only instructions in the subset such that the program code is interpretable by the simple interpreter, choosing to interpret the program code using the simple interpreter (see for example, figure 2, "lookup source address", "Translation exists?", "Execute count > translation threshold?" and related text. Only a subset of instruction that have not been translated and the execute count less than translation threshold is selected for interpreter; also see page 48, section "HOW IT WORKS", "The start-up module then loads the other Aries components and transfers control to the Aries runtime module, which invokes the interpreter to start the actual emulation."); and
- Choosing to translate said program code using a translator when said program code is not interpreted. (Page 48, section "HOW IT WORKS", "If a block has executed a fixed number of times, the runtime module then invokes the dynamic translator, which translates the PA-RISC block into a block of native IA-64 instructions...")

Claims 2, 11 and 20:

Zheng also discloses that the method, apparatus and executable software in computer-readable medium wherein said program code further comprises basic block of program code. (Page 49, section "Interpreter", "Thus, Aries interprets any PA-RISC basic block that contains this kind of instruction instead of translating it.")

Claims 3, 12 and 21:

Zheng further discloses a method, apparatus and software can be stored in a computer-readable medium that is executable by a computer to perform the method of translating program code, wherein the step of applying an interpreting

algorithm comprises determining whether instructions in said program code are included in a subset of instructions capable of being interpreted by the interpreter. (Page 48, section "Interpreter", "The fast interpreter is the emulation safety net because it handles all possible blocks, including those not yet translated or too complex to translate. Certain PA-RISC instructions have no simple matching IA-64 instructions that are functionally equivalent. For these, interpretation makes more sense than translation into native IA-64 instructions.", "The interpreter also identifies blocks that are difficult to translate, as in figure 3, marking them as 'bad blocks'", Page 50, Figure 3, notes, "A bad instruction block in Aries, The Aries interpreter is responsible for identifying these blocks")

Claims 8, 17 and 26:

Zheng discloses a method, an apparatus and an executable software stored in a computer-readable medium as in claims 1, 10 and 19 above and Zheng further discloses that applying interpreting algorithm to identify whether the program code is interpretable comprises determining whether an execution count of the program code is below a translation threshold, wherein the program code is translated by the translator if the execution count of the program code is greater than or equal to the translation threshold. (Page 49, Figure 2, notes, "If it has not been translated, the runtime module looks at how many times that block has executed and compares it against a translation threshold to determine if the target block is ready for translation. If it does not qualify, the Aries runtime module increments the execution count for that block and returns control to the interpreter. If the block has reached the translation threshold, the Aries runtime module invokes the translator to produce dyncode.")

Claim 9:

Zheng discloses a method, an apparatus and an executable software stored in a computer-readable medium as in claims 2, 11 and 20 above, Zheng further

discloses the step of applying interpreting algorithm to identify whether the basic block of program code is interpretable comprises determining whether an execution count of the program code is below a translation threshold, wherein the basic block of program code is translated by the translator if the execution count of the basic block of program code is greater than or equal to the translation threshold. (Page 49, Figure 2, notes, "If it has not been translated, the runtime module looks at how many times that block has executed and compares it against a translation threshold to determine if the target block is ready for translation. If it does not qualify, the Aries runtime module increments the execution count for that block and returns control to the interpreter. If the block has reached the translation threshold, the Aries runtime module invokes the translator to produce dyncode.")

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-7, 13-16 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng in view of Warnes (Peter Warnes, US 7,051,189 B2).

Claims 4, 13 and 22:

Zheng discloses a method and apparatus for performing interpreter optimizations during program code conversion as in claims 3, 12 and 21 above about how to use "execute count" to switch between code interpretation and translation and how to determining the subset of instructions capable of being interpreted by the interpreter, but does not disclose how to select the subset of instructions as a portion of an entire instruction set for the program code. However, Warnes discloses a method and apparatus for optimizing the instruction set of a digital processor code using code compression. (Fig.1, steps 108, 110, Col.9, lines 1-50, "The ultimate determination is made by calculating the program size using the proposed new instruction set. If the size is sufficiently small, the compressed instruction set is selected."). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Warnes' method of selecting compressed instruction set in Zheng's start-up or runtime modules to configure the interpreter supported instruction set. One would have been motivated to use portion of entire instruction set to interpret most of program code in Zheng's interpreter and pass other program code to Zheng's translator in order to further improve the performance by reducing some interpreting time.

Claims 5-7, 14-16 and 23-25:

Zheng and Warnes disclose the method and apparatus as in claims 4, 13 and 22 above, but Zheng does not disclose selecting instructions from the most frequently executed instructions, using selected instruction to interpret program application and selected instruction that is capable of interpreting a majority of the basic blocks of the program application. However, Warnes discloses that the subset of instructions selecting step comprises selecting instructions from the entire instruction set which are executed most frequently across at least one program application. (Fig.1, step 104, "determine static frequency of each instruction type", step 106, "sort instruction types by frequency", step 108, "determine number and type of instructions necessary for correct program

execution", step 110, "create compressed instruction set encoding"). Warnes also discloses that the selected subset of instruction is capable of interpreting a specific target program application or a majority of the basic blocks of program application (Col.9, lines 20-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to integrate Warnes' feature that selects the most frequently executed subset of instructions which can be used to interpret majority instructions or basic block of the program code in Zheng's optimization method which only uses "execute counter". One would have been motivated to combine Warnes' and Zheng's optimization methods together to optimize the translation procedure for the program code. If the instruction or basic blocks cannot be interpreted by interpreter which contains the most frequently executed instruction set, it is passed to the translator to translate. So the interpreter with "reduced instruction set" can be executed faster and more efficiently during the whole translation process.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zheng Wei whose telephone number is (571) 270-1059 and Fax number is (571) 270-2059. The examiner can normally be reached on Monday-Thursday 8:00-15:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695. The

fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature of relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571- 272-1000.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ZW



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